

## COMPLETE LISTING OF CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims 1-37 (cancelled)

38. (currently amended) A In a direct expansion ("DX") geothermal heat exchange system, having a DX geothermal heat pump operable ~~ting in a the-heating mode and including a sub-surface geothermal heat exchanger, an improvement comprising a supplemental solar heating system including a solar heat collector fluidly connected to a solar heat to direct expansion system refrigerant fluid heat exchanger by fluid transport tubing, wherein solar heat acquired from a~~ the solar heat collector is conveyed by means of a fluid within the fluid transport tubing, and the solar heat is transferred, by the a-solar heat to direct expansion system refrigerant fluid heat exchanger—means, to the—refrigerant fluid in the DX geothermal heat pump—a direct-expansion system.

39. (currently amended) A In a geothermal direct expansion ("DX") heat exchange system, having a DX geothermal heat pump operable ~~ting in a the heating mode and including a sub-surface geothermal heat exchanger, an improvement comprising a supplemental solar heating system including a solar heat collector fluidly connected to a solar heat to direct expansion system refrigerant fluid heat exchanger by transport tubing, wherein solar heat acquired from a~~ the solar heat collector is conveyed by means of a fluid within the transport tubing, and the solar heat is transferred, by a the solar heat to direct expansion system refrigerant fluid

heat exchanger ~~means~~, to the refrigerant fluid immediately prior to the refrigerant fluid entering the sub-surface geothermal heat ~~exchanger~~ ~~transfer environment of the direct expansion system.~~

40. (currently amended) The system of claim 38 wherein ~~all solar heat the~~ fluid transport tubings between the solar heat collector and the solar heat to refrigerant fluid heat exchanger ~~means~~ isare insulated, and wherein the exterior of the solar heat to refrigerant fluid heat exchanger ~~means~~ is insulated.

41. (currently amended) The system of claim 38 wherein the solar heat to refrigerant fluid heat exchanger ~~means~~ is located at an elevation above that of the solar heat collector.

42. (currently amended) The system of claim 38 ~~wherein~~ further comprising a solar heat transfer termination devicmeans ~~is provided~~, which solar heat transfer termination devicmeans is ~~only~~ only ~~activated~~ only when the DX geothermal heat exchange ~~direct expansion system~~ is operating in a ~~the~~ cooling mode, and during periods of time when ~~the~~ supplemental heat supplied by the solar heat collector is at a lower temperature than a ~~the~~ maximum temperature in the sub-surface geothermal heat exchanger ~~geothermal heat exchange sub-surface environment,~~ and ~~which solar heat transfer termination means is otherwise de-activated.~~

43. (currently amended) A direct expansion geothermal heat exchange system, operating in the heating mode, comprising a supplemental solar heating system wherein heat acquired from a solar heat collector is conveyed by means of a fluid within transport tubing, and the solar heat is transferred, by a solar heat to

direct expansion system refrigerant fluid heat exchange means, to the refrigerant fluid in a direct expansion system, wherein the solar collector's heat transfer tubing is always sloped in an upward vertical orientation from the bottom of the solar heat collector to the top of the solar heat to direct expansion refrigerant fluid heat exchange means, and wherein the solar collector's heat transfer tubing is always sloped in a downward vertical orientation from the top of the solar heat to direct expansion refrigerant fluid heat exchange means to the bottom of the solar heat collector.

44. (currently amended) The system of claim 38 ~~wherein there is further comprising refrigerant tubing fluidly connected to the solar heat to direct expansion refrigerant fluid heat exchanger, the refrigerant tubing including an inverted U bend in the direct expansion heating system's refrigerant transport tubing situated above the solar heat to direct expansion refrigerant fluid heat exchange means.~~

45. (currently amended) ~~The system of claim 38~~ A direct expansion geothermal heat exchange system, operating in the heating mode, comprising a supplemental solar heating system wherein heat acquired from a solar heat collector is conveyed by means of a fluid within transport tubing, and the solar heat is transferred, by a solar heat to direct expansion system refrigerant fluid heat exchange means, to the refrigerant fluid in a direct expansion system, wherein the solar heat to direct expansion refrigerant fluid heat exchange means is situated at a point in the direct expansion system's liquid refrigerant transport line after the direct expansion system's heating mode refrigerant expansion device and before the

point where the direct expansion system's thermally exposed sub-surface refrigerant transport geothermal heat exchange tubing is located.

Claims 46-52. (withdrawn)

Claims 53-58. (cancelled)

59. (previously added) A geothermal heat exchange system, operating in the heating mode, comprising:

a geothermal heat pump, the geothermal heat pump including system refrigerant tubing and system refrigerant moving through the refrigerant tubing;

a supplemental solar heating system, the supplemental solar heating system including a solar collector, solar heating transport tubing thermally coupled to the solar collector, and solar heating fluid moving within the solar heating transport tubing;

a heat exchanger thermally coupled to the supplemental solar heating system and to the geothermal heat pump; and;

wherein heat acquired from the solar collector is conveyed to the solar heat heating fluid within the solar heating transport tubing, and the solar heat is then transferred by the heat exchanger to the system refrigerant in the system refrigerant tubing.